

STBIO 440  
Capstone Project Instructions

The aim of the capstone is to integrate skills students have learned between Fundamentals of Scientific Computing (STBIO 400) and Applied Bioinformatics and Computational Biology (STBIO 440) courses into a suite of tangible figures reproduced from current RNA-Seq publications. In addition to the capstone building on the student's critical thinking, it will also provide opportunity to present and review findings much like one's work at a conference or for a manuscript.

Students are assigned to groups of 3 individuals total, with one of three RNA-Seq publications

- [Xin et al. 2016 Nature Immunology](#) Figure 7A (+7C for advanced)
- [Akondy et al. 2016 Nature](#) Figure 2E
- [Ichikawa et al. 2019 Nature Immunology](#) Figure 6 (Supplemental)

Advanced students can reproduce figures from [Sergestolpe et al. 2016 Cell Metabolism](#) (Figure 5C) in addition to their assigned paper for receiving up to 2 extra points (32 out of 30).

Students are suggested to (a) first read their assigned paper and take annotated notes of it as we walk through Week 6 - 8 of RNA-Seq Analysis, then (b) begin to identify how they want to approach reproducing their figures during Week 9 on an individual level, and then (c) discuss individual processes as assigned groups during Week 10. Students will have Week 11 to continue working on their capstone, then present on their assigned date and time on Week 12.

Prompt questions unique per group

\*Note these questions are intended to differentiate presentations on identical papers between groups, but can be utilized by students in their reports and/or code as well

- a. Does the figure(s) adequately support the findings?
- b. How would you extend this paper in experimental design?
- c. How would you extend this paper in coding (analysis and/or figure)?

Grading (30 points total, 30% of STBIO 440 grade)

Component	Points	Breakdown
Content	15 points total	
- Individual Report	5 pts	Student composes a 1-page, short essay summary report that details (a) the approach the student took to reproduce the image(s) and reasoning, along with (b) specific contributions as an individual vs knowledge gained from peers in the group during the process of compiling the figure. Report due on Dec 10th at 12 PM PST / 3 PM EST.
- Code (Group)	10 pts	<div>5 pts</div> <div>Group submits a jupyter notebook (.ipnyb) that walks through the process of the publication reproducibility from start to finish.</div> <div>5 pts</div> <div>Notebook must outline and detail (balanced) individual</div>

		<p>contributions. Notebook should include documentation as one may submit as a supplemental to a manuscript.</p> <p><b>Due on Dec 10th at 12 PM PST / 3 PM EST.</b></p>
Presentation	10 points total	
- Organization	5 pts	<p>Presentation is graded as a group by organization, structure, flow, understandability, and timeliness (12 minutes + 3 minutes for questions) out of 5 points with 1 point given per each category. Presentations on the same paper are distinguished by answering and addressing assigned prompts.</p>
- Team contribution	5 pts	<p>Presentation is graded as an individual by clear demonstration of balanced individual workload and ability to support their team with 2.5 points per category.</p>
Peer Review	5 points total	<p>Student submits a ½ page individual report detailing their scores for a group presentation (out of 10) based on the group criteria above as outlined. Students should include reasoning in a manner that one might do as a reviewer. Student should write their report with the intention that the group will receive this as feedback, as one might do in a review (names will be anonymous). Report is due as an extension of the individual report (1.5 pages total) on <b>Dec 10th at 12 PM PST / 3 PM EST.</b></p>